IPv6 Deployment in HK Government

IPv6 Certification Testing and Application Sharing

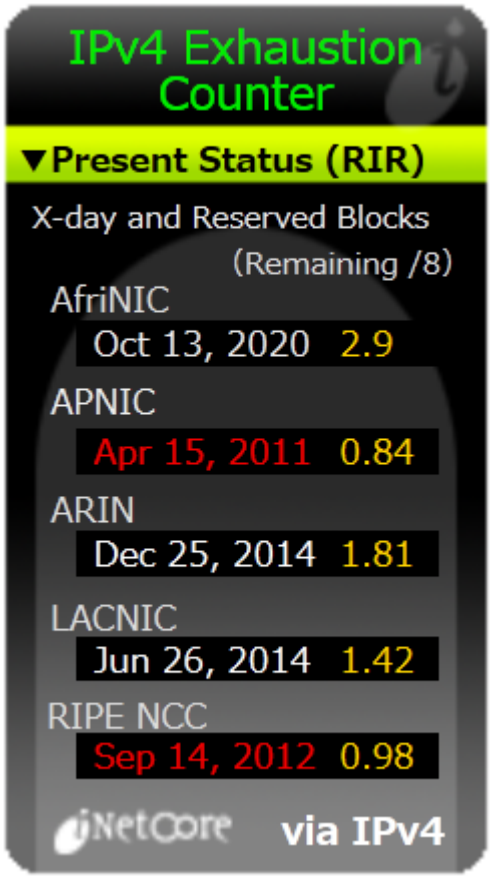
13 September 2013

Agenda

- IPv6 Status Update
- IPv6 Deployment in Hong Kong
- IPv6 Deployment in the Government
- Some Observations in IPv6 Usage

IPv6 Status Update

- The Internet is the “killer app” for IPv6
- APNIC’s IPv4 address pool exhausted in 2011
- RIPE’s pool in 2012
- LACNIC’s pool in mid 2014
- ARIN’s pool in end 2014
- Must enable IPv6 to keep connected despite plenty of available IPv4 addresses in HK



IPv6 Deployment Milestones

- World IPv6 Launch (6 June 2012)
  - Over 2,000 websites, network operators and home networking equipment manufacturers support IPv6 permanently

IPv6 Deployment Milestones

- IPv6 has become part of the regular business
- ISPs offer both IPv4 & IPv6 connections to new customers
- Prominent operating systems support both IPv4 & IPv6
- Individuals may not even know they are using IPv6

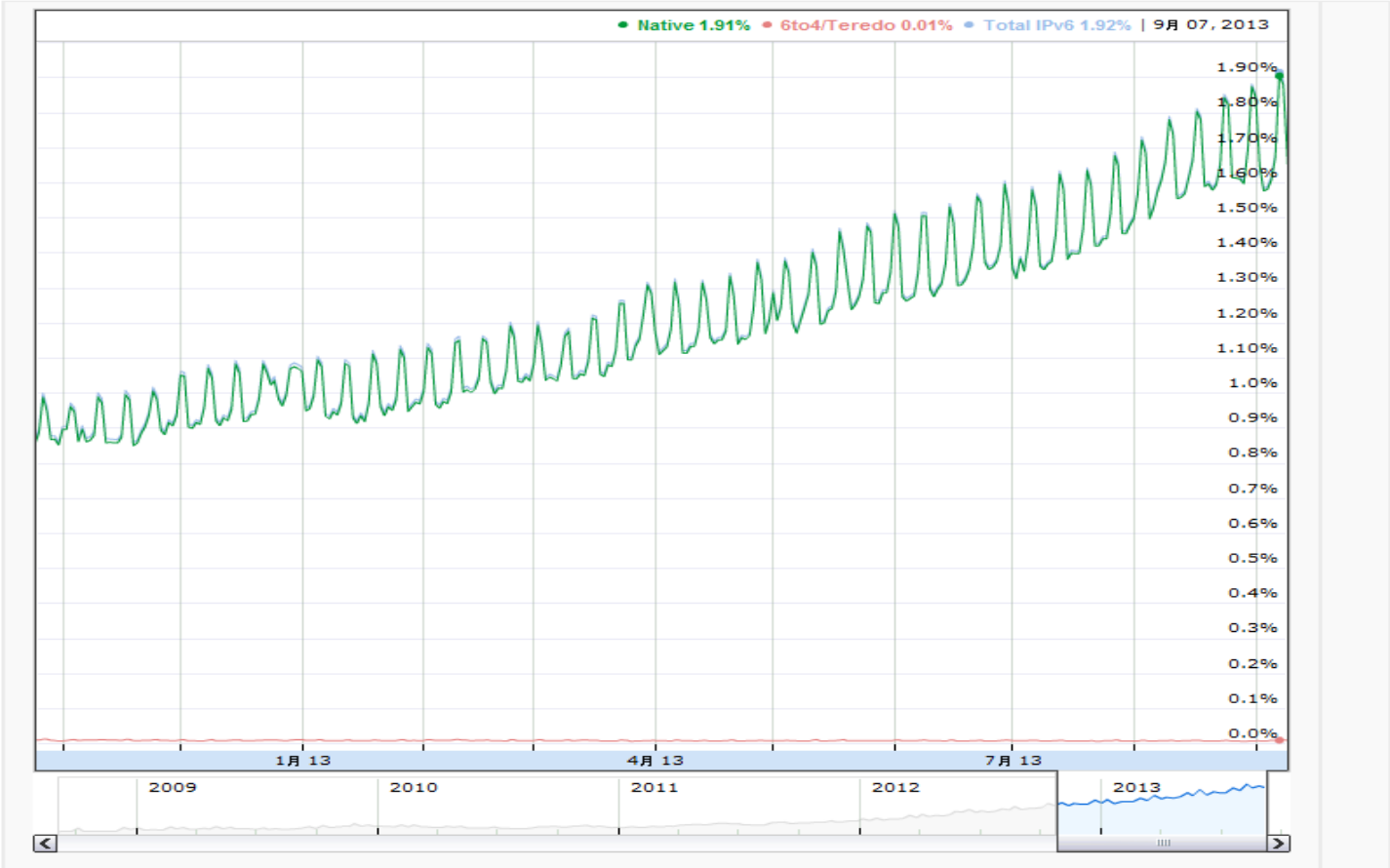
How many IPv6 users ?

- In 7 Sep 2013, 1.9% of Google users use IPv6
- In June 2012, 0.6% only
- Assuming 1.9% of all 2.7 billion Internet users are using IPv6, there are over 50 million IPv6 users

Google IPv6 users by date

IPv6 Adoption

We are continuously measuring the availability of IPv6 connectivity among Google users. The graph shows the percentage of users that access Google over IPv6.



Google IPv6 users by economy

#	Economy	IPv6 Internet User ratio	V6 Users (Estimated)
1	Switzerland	9.33%	603,103
2	Romania	7.82%	676,473
3	Luxembourg	5.71%	26,930
4	France	5.09%	2,559,829
5	United States of America	4.12%	10,318,636
6	Germany	4.10%	2,784,613
7	Japan	3.43%	3,452,791
8	Belgium	3.19%	271,022
9	Peru	2.99%	316,540
10	Singapore	2.03%	75,701
	China	0.54%	3,064,063
	Chinese Taipei	0.36%	58,413
	Hong Kong	0.17%	8,407

IPv6 deployment in Hong Kong

- Assignment of IPv6 addresses to Hong Kong
  - In 2001, 1st IPv6 address segment assigned to a local ISP
  - In 2002, 2nd segment assigned to HKIX, 3rd segment assigned to HARNET
  - In 2006, two segments assigned to Cyberport and OGCIO respectively
  - In 2013, segments already assigned to over 150 organizations

IPv6 deployment in Hong Kong

- Early IPv6 adopters
  - In 2001, a local ISP offered commercial IPv6 service
  - In 2003, HARNET established a 45Mbps IPv6 connection to Internet2
  - In 2004, HKIX started supporting IPv6
  - In 2006, HKIRC started providing IPv6 domain name services
  - In 2006, Cyberport started offering native IPv6 connections to tenants

IPv6 deployment in Hong Kong

- Current status of IPv6 deployment
  - Plenty of ISPs offer commercial IPv6 Internet connection services
  - Some data centres and web hosting services providers support IPv6
  - IPv6 traffic recorded from over 60 organizations in HK
  - IPv6 certification trainings are available in HK since 2011
  - Still no residential IPv6 service
  - Up to 2% traffic in HKIX is IPv6 (daily average)
  - 0.17% of Google users in Hong Kong adopt IPv6
  - Hong Kong is allocated 11.7 million IPv4 address. No sign of IPv4 address shortage now

IPv6 deployment in Hong Kong

- How to test IPv6 without IPv6 connection ?
- goIPv6 services launched in July 2013
  - Free IPv6 tunnel over IPv4
  - Easy to use, several steps setup in ten minutes
  - No client program required
  - Local support hotline
  - Requires ICMP; if under NAT, protocol 41 support
- Other alternatives are gogoNET, HE or 6fei

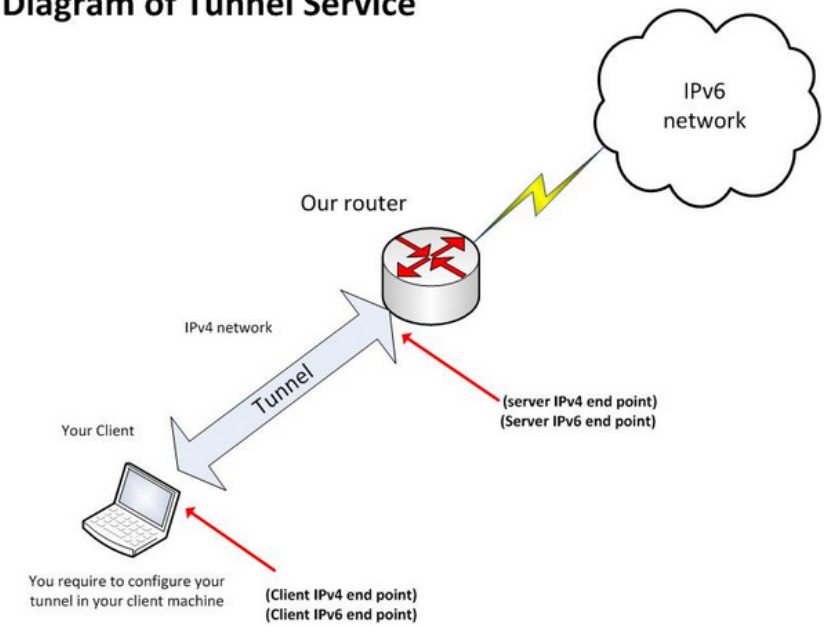
IPv6 deployment in Hong Kong

Set up screen at www.goipv6.hk

You have successfully registered a new tunnel on our system.
Next, you will have to configure the tunnel on your computer or host machine. Please click here to learn more.

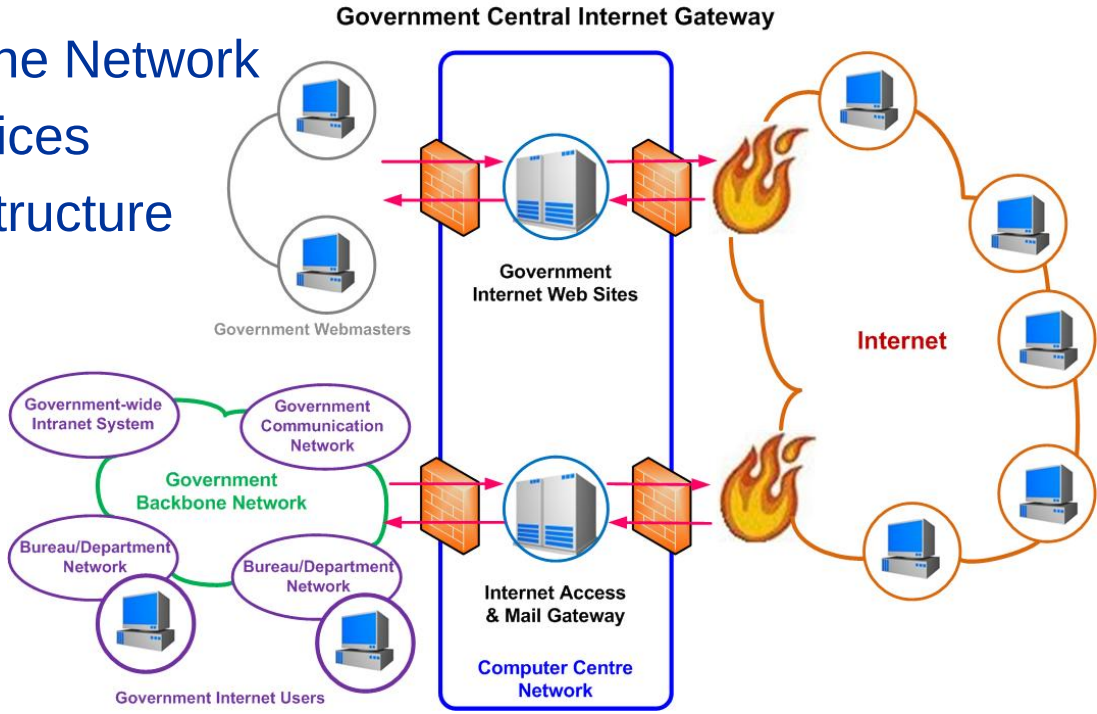
Tunnel Name:	wtpchan-tunnel-02
Created Date:	2013-09-11
Last Modified Date:	2013-09-11
IPv6 Tunnel End points	
Server IPv4 Address:	218.213.65.154
Server IPv6 Address:	2001:2e0:6002:8082::1/64
Client IPv4 Address:	202.128.252.141
Client IPv6 Address:	2001:2e0:6002:8082::2/64
Routed IPv6 Prefixes	
Routed /64:	2001:2e0:6002:a082::/64
DNS public resolver	
Google Public DNS IPv6 addresses:	2001:4860:4860::8888

Network Diagram of Tunnel Service



IPv6 deployment in HK Government

- Take lead in deploying IPv6
  - The Central Infrastructure upgraded by phase to support IPv6 since 2008
    - Government Backbone Network
    - Central Internet Services
    - e-Government Infrastructure Service



IPv6 deployment in HK Government

IPv6 Implementation approach for Central Internet Services

- Procure IPv6 ready equipment during natural technology replacement and capacity enhancement
- Adopt dual stack approach as far as possible
- Focus on external service provision instead of internal infrastructure adoption
- Implement by services, phases, and data centres

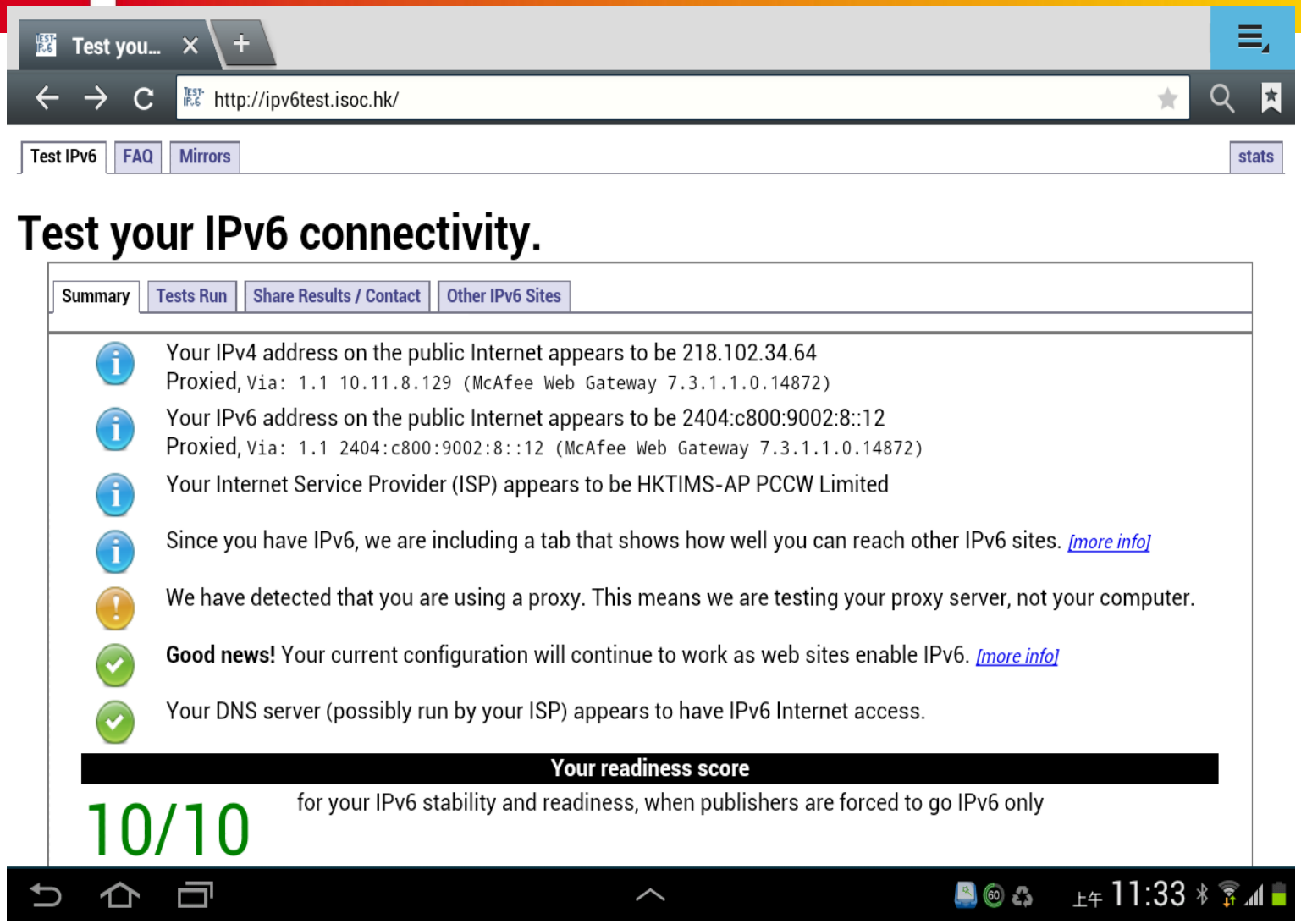
IPv6 deployment in HK Government

- Take lead in deploying IPv6
  - Over 250 Government websites can be accessed via IPv6
  - Over 60 Government B/Ds can exchange Internet e-mails via IPv6
  - Over 40 Government websites are awarded the “IPv6 Enabled web site Logo” by the IPv6 Forum

IPv6 deployment in HK Government

- Take lead in deploying IPv6
  - All hardware and software procured through the Government Standing Offer Agreements must support IPv6
  - OGCIO provides B/Ds with facilities for conducting IPv6 readiness tests
  - OGCIO conduct IPv6 readiness survey and let B/Ds know their relative IPv6 readiness
  - The Hong Kong Observatory launched the IPv6 Network Time Service in March 2012
  - The next generation Government Wi-Fi Programme launched on 21 December 2012 support IPv6

GovWiFi Supports IPv6



Promotion of IPv6 deployment

- Objectives
  - Raise awareness of general public and SMEs on IPv6
  - Provide guidelines on the use of IPv6
- Means / Deliverables
  - The "IPv6 In Action" project between Oct 2011- Nov 2012
  - The thematic web site

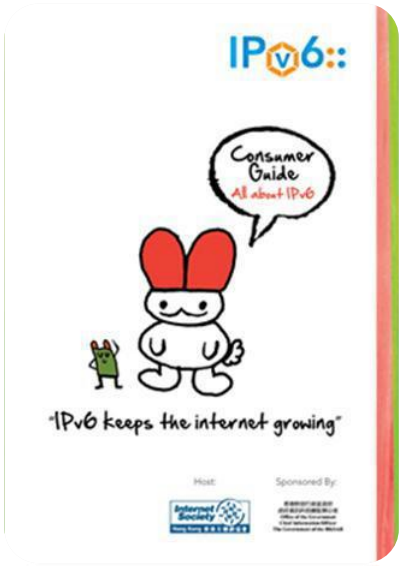
    http://ipv6now.hk

Promotion of IPv6 deployment

- Means / Deliverables
  - 4 seminars and 1 exhibition
  - 20,000 promotion pamphlets and 500 posters
  - 3 radio programs, 1 animation, Youtube videos
  - 5 byline articles, 3 media interviews and 2 radio talk shows

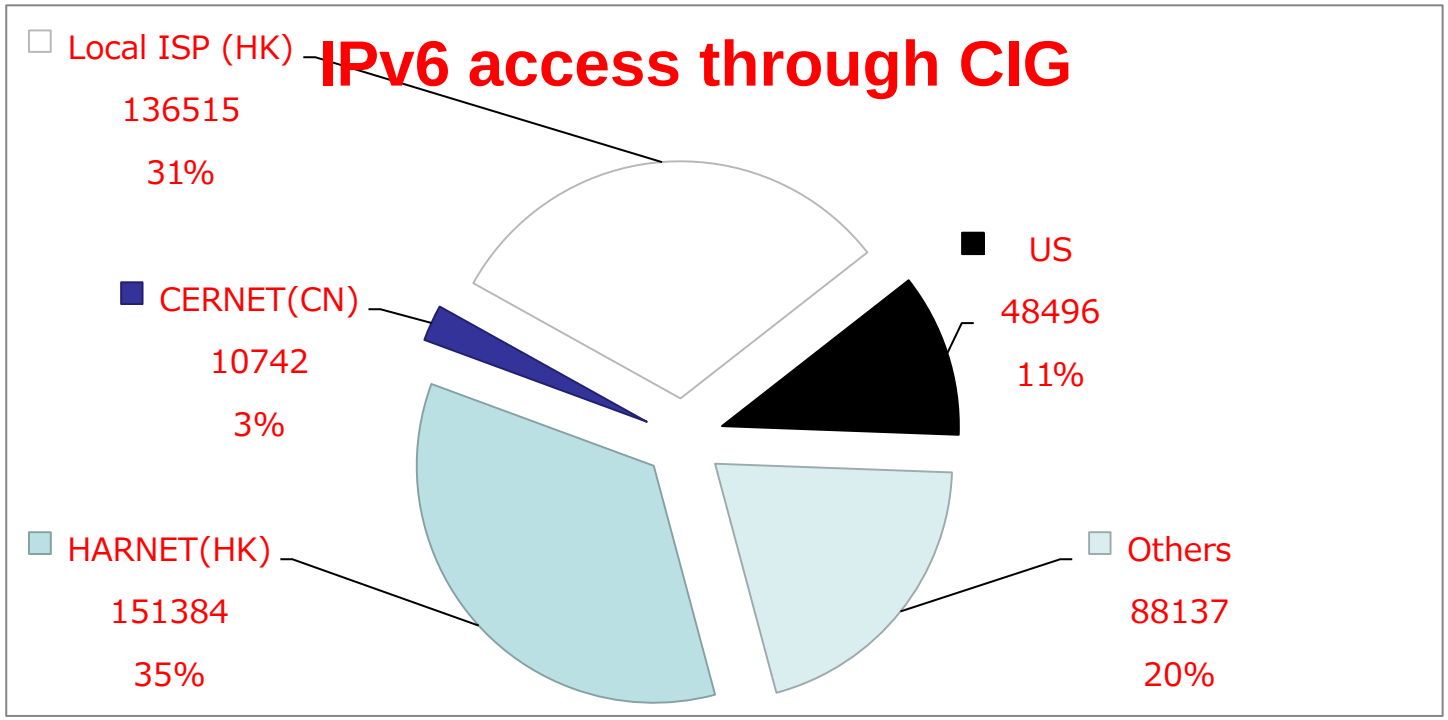
Promotion of IPv6 deployment

- Means / Deliverables
  - Apps, which test IPv6 connectivity, on iOS and Android
  - The well received "IPv6 Consumer Guide"



IPv6 Usage

- In July 2013, there was 435K page views from IPv6 users through the Central Internet Gateway (CIG) to Government websites
- Geographical distribution of the users :



IPv6 Usage

- Other areas include Europe and Africa
- People all over the world visited Government websites using IPv6.

Thank you !